2

A COMPENDIUM
OF THE
Medicinal Properties
OF THE
CHLORIDES
OF
LIME AND SODA:
AND
Of their Uses
IN
DESTROYING NOXIOUS EFFLUVIA,
AND
PRESERVING HEALTH ON BOARD SHIPS AND IN WARM CLIMATES.

By FREDERIC FINCHAM,
MANCHESTER.

LONDON:
PUBLISHED BY J. M. RICHARDSON, CORNHILL:
And may be had of the principal Booksellers.
1828.

Sold by Arnauld
2 Spring Gardens

WELLCOME
LIBRARY
INSTITUTE

PREFACE.

The Chlorides of Lime and Soda having been beneficially and extensively introduced into medical practice, it became a matter of great importance to obtain them of uniform strength and in perfect combination, upon both of which their valuable properties mainly depend. By unremitted attention for many months to experiments on the most extensive scale, these desiderata have been obtained; and in my preparations, although equally efficacious with those of the French Formula, the evolution of Chlorine is so gradual as to be almost imperceptible to the most delicate patient; and by excluding the air, they will keep for any length of time.

Having it in my power, through the kindness of several medical friends, who were amongst the first in this country to try their efficacy, to adduce some valuable testimony in their favour; I have collected in the following pages all that is at present known—or rather, as much as has come to my knowledge—respecting them.

From the conviction that I could not render a more acceptable service to those who may not possess the works, I have availed myself of M. Labarraque's and Dr. Reid's valuable publications; particularly in making copious extracts from the latter, upon the action in cases of dysentery and fever, as most interesting to the profession in tropical climates, where those diseases generally prevail.

Upon the medical properties, it would ill become me to offer any remarks; and I have, therefore, confined myself to the collection of facts, which I have prefaced with a summary derived from the facts themselves.

A successful experiment with the Chloride of Lime on Harrogate water and offensive effluvia, led me to suggest to the Honourable Commissioners of H. M.'s Navy Board, its use on board ships, for destroying the smell of bilge-water and purifying the hold; and I had the satisfaction of fully proving its efficacy in these respects, on board H. M.'s ships at Deptford and Chatham.

Whilst engaged in these experiments, I had an opportunity of further proving its beneficial effects in purifying contaminated air, on board tho *Argonaut* hospital ship; for which, I am indebted to Dr. Burnett, medical commissioner, who came down from London expressly for the purpose of witnessing the effects, which will be found detailed in page 30.

To the kindness of George Clay Esq., managing owner of the H. C. S. *Windsor*, I am indebted for its first employment on board a British vessel, and for the subjoined report of Mr. Docker, the surgeon, (page 31,) which so fully corroborates the advantages to be derived from its use, that it would be superfluous to add any thing further in its recommendation.

I am under the greatest obligation to Mr. Robertson, surgeon, R.N. Chatham, for the assistance he afforded me in the experiments made at Chatham, and for its subsequent introduction on board the convict vessels, by order of the Home Department. But his valuable reports will best evince the interest he has taken in the investigation.

Being satisfied, by these and other experiments, that the cause of its action laid in the affinity of Chlorine for hydrogen; I have applied it in every instance where hydrogen is to be found, such as the inflammable air of mines, the stagnant water of ditches, and decomposition of animal and vegetable substances. The result of these experiments will be found in a paper which I transmitted to the Royal Society, and in another to the Medico-Botanical Society.

The following chemical characteristics of Chlorine may induce a further investigation of its properties, by the medical profession; and the result prove alike interesting to physiological science and the public welfare:—

1. Chlorine is an undecomposed substance that supports combustion.
2. In its electrical relations, it is attracted to or elicited from the positive surface.
3. Chlorine, oxygen, and iodine, agree in many of their characters.
4. The weight of Chlorine—its colour—its absorbability by water, are all in favour of its being a compound; and it is possible that oxygen may be one of its elements, or that oxygen and Chlorine are similarly constituted.
5. It unites with hydrogen, however combined, to form muriatic-acid.

6. With oxides, it either expels their oxygen or causes it to enter into new combinations.

7. Chlorine has never been found pure in nature, but exists in many compounds—particularly in common salt, which is composed of one proportion of sodium and two of Chlorine. Sodium has a much stronger attraction for Chlorine than for oxygen; and soda or hydrate of soda is decomposed by Chlorine, oxygen being expelled from the first, and oxygen and water from the second. In bleaching with Chlorine, water must necessarily be present, as the oxygen is derived from the water, which is decomposed by double affinity,—that of hydrogen for Chlorine, and of the colouring matter for oxygen.

8. Mercury combines with Chlorine: when the metal is heated in the gas, it burns with a pale red flame, and the substance called *corrosive-sublimate* is formed. When corrosive-sublimate is long rubbed with mercury till they are incorporated together, and the mass sublimed, the substance called *calomel* is formed. The quantity of Chlorine in calomel is to that in corrosive-sublimate as 1 to 2, the quantity of mercury being the same in both. Calomel is tasteless, corrosive-sublimate has an acrid burning taste; calomel is insoluble, corrosive-sublimate soluble in water.

9. The bodies that follow are arranged in the order of their attractions for Chlorine: potassium, sodium

zinc, iron, lead, silver, antimony, bismuth, phosphorus, copper, sulphur, mercury, platinum, gold.

10. Antimony burns spontaneously when powdered and thrown into Chlorine. In this way, the only known compound of antimony and Chlorine, or butter of antimony, is formed.

11. When Chlorine gas is exposed to light, it undergoes no change; but when a solution of it in water is placed under the same circumstances, oxygen is given off, and a solution of muriatic-acid is found in the water. Water is the great solvent employed in chemical processes, and its operation, therefore, should be strictly attended to. It has been too much the custom to consider its elements as almost passive in the process of dissolution and decomposition; but there are a number of instances in which these elements are newly arranged, and in which their transfer and changes produce very important phenomena. There are a number of substances which possess an attraction of a peculiar kind for water: these absorb water without undergoing any remarkable change in their properties, and in small proportions: such are charcoal, different earths, and animal and vegetable substances.—*Davy's Elements of Chemical Philosophy.*

12. Albumen is coagulated by the Chloride of Lime, but not by the Chloride of Soda.

ON THE CHLORIDES OF SODA AND LIME.

Chlorine, under the name of Oxymuriatic-Acid, has been long known to possess active medicinal properties: and was applied, by Mr. Cruikshank and Dr. Crawford, in gangrene; by Dr. Scott, of Bombay, as a bath for liver complaints; and by Dr. Brown, in atonic and syphilitic disorders; by Guyton Morveau and others, as a fumigation, for the prevention of infection; and extensively, by Mr. Faraday, at the Penitentiary. From the inconvenience attending its production, the unmanageable and irritating nature of the uncombined gas, its use was necessarily confined to houses and apartments from which the inmates were previously removed, and its value as a medicine very much limited. For the purposes of bleaching, these difficulties had been long since overcome, by uniting it with Lime, which renders it capable of general application. M. Labarraque was the first to point out the advantages to be derived from its application to medical purposes, in combination both with Lime and Soda: but, even in his preparations, (the formulæ for which have been received into the French Materia Medica,) the gas is too rapidly evolved, liable to excite irritation, and, by decomposing the water, to lose its peculiar properties,

The Chlorides of Soda and Lime, besides being the most powerful antiseptics, possess the property of destroying all fœtid exhalations arising from animal and vegetable decomposition, by combining with the hydrogen, which is invariably one of the products resulting from such decomposition: and, to use the words of Mr. Brande, "as the effluvia which arise from putrescent substances, and more especially those generated in certain putrid disorders, have a tendency to create peculiar diseases, or to give the living body a tendency to produce poisons analagous to themselves;"---the Chlorides destroy these, by acting chemically upon the pernicious matter, and resolving it into innocuous principles: and either of them may be efficaciously used to destroy the germ of all infectious diseases, by sprinkling the liquid, diluted with forty parts of water, about the chambers of the sick,---suspending the use when its smell becomes perceptible; by immersing in it the linen &c. of the patient, which should be rinsed in pure water before being sent to wash; and by receiving the discharges from the patient in vessels in which a wine-glassful has been previously added to the water.

The Chloride of Soda is preferable for medicinal purposes; as, at the same time that the Chlorine destroys the fœtor of wounds, the Soda acts as a mild alkali on the proud flesh, and disposes the diseased parts to a healthy granulation. It has been found to act very beneficially, as a *lotion*, in carbuncle, ill-conditioned ulcers and gangrenous sores of every description, fœtid discharges of cancer, herpes ulcerans, porrigo favosa, atonic ulcers, ulcers of the uterus, mortification, tinea capitis, burns, scalds, &c.; as a *gargle*, in ulcerated sore throats, ptyalism, spongy gums, and carious teeth; as an *affusion*, in the hot stage of fevers, while the skin is dry, and in all infectious diseases; and as a *stimulant*, in asphyxia and syncope. The *proportions* to be used, are best left to the judgment of the medical practitioner; and are varied with the circumstances of the case, from one in five to one in forty parts of pure water: no danger will arise from using the stronger proportions, as the

Chlorine, from being so intimately combined, will be evolved much slower than when more diluted; it is probable, however, that frequent repetitions of the weaker, will prove most efficacious. As an *internal medicine*, it has been hitherto but little used: but as oxymuriatic-acid has been given in scarlet[4] and other fevers, in doses of eight to ten drops;---and when it is considered, that calomel and corrosive sublimate are Chlorides of mercury; it is deserving of consideration, whether Chlorine, in its milder combination with Soda, may not be beneficially substituted in many cases. Should the Chlorine be too rapidly evolved by the presence of an acid in the stomach, a solution of ammonia will give instant relief.

The Chloride of Lime, from its very moderate price, is best adapted for the general purposes of correcting, by occasional sprinkling, the confined air of workhouses, prisons, ships, courts of justice, and places of public resort; of purifying drains, sewers, cesspools, &c.; and of preserving the health of persons engaged in the deleterious processes of preparing oil-colours, and smelting the ores of copper, lead, &c. It will be found essentially to promote health and comfort in hospitals, if, with the usual attention to fresh air and cleanliness, the diluted liquid be sprinkled twice a-day about the wards: in this and similar instances, it acts by double affinity,---the Chlorine combining with the animal effluvia, and the Lime with the carbonic acid of exhaled air. For the purpose of fumigation. (the patients being removed,) it is only necessary to add a few ounces of diluted sulphuric-acid to the requisite quantity of the pure liquid.

Prepared by FREDERIC FINCHAM, Manufacturing Chemist,
Manchester:

And may be had of all the principal Chemists and Druggists.

TESTIMONIES

ON THE USE OF THE CHLORIDES OF SODA AND LIME, FOR MEDICINAL PURPOSES.

From A. Robertson, Esq. Surgeon, R.N., Canada *Hospital Ship, Chatham, March* 10*th,* 1827.

I EMPLOY the Chloride of Lime, as prepared by *Mr. Frederic Fincham,* of Manchester, in every case of disease in which the effluvia are offensive: to correct the immediate atmosphere of all infectious complaints; to purify the privies, close-stools, bed-pans, and bed-linen, of sick patients; and to destroy the smell of bilge-water.

It is the most powerful and safe disinfecting agent with which I am acquainted; and ought to be constantly kept on board all vessels, whether of the royal navy or merchants' service.

Extract from a letter, from the same, dated, Chatham, September 9*th,* 1827.

My experience of the Chloride of Lime, as a disinfector, continues to justify the first sanguine expectations which I had formed of it: it has not failed me in any instance.

We have had, amongst the horses here, a fatal disease something like brain-fever, but not confined in its attacks to that organ alone. In a very large establishment, (upwards of 100 horses,) I had the stables well washed with the Chloride; and whether it was from this, the season altering, or some other cause, certain it is, the disease disappeared.

From Newgate and other jails, we constantly receive broken-down knaves, covered with foul ulcers, generally in a very bad state. We now cover them with oatmeal made into a poultice with the Chloride of Lime instead of water, and with much advantage. It never excites pain in either this or any other form.

Extract from another letter, from the same, dated, Chatham, November 1*st*, 1827.

Scarlet-fever has been raging in this place with considerable violence. I attend a school of forty boarders, to one of whom I was called, and found him under an acute attack of the disease. I isolated his bed with the Chloride of Lime, and kept the passage leading to it under its influence. No other pupil caught the disease.---I do not mean to say, that it was prevented spreading by this agent; however, it did not spread, and the Chloride was used.

Extract from a letter received from R. Thorpe, Esq. Surgeon to the Manchester Infirmary, dated, September 13*th*, 1827.

I have used the Chloride of Soda in two cases of extensive sloughing chancre, diluted one in twenty; and I must say, with very beneficial effects; leaving a clean ulcer on the second day. I have applied the Chloride in other cases of ulceration, generally with very great advantage.

Extracts from a letter received from Mr. George Fincham, Surgeon, dated, London, January 10*th*, 1828.

In a case of offensive rheum, arising from excoriations of the scrotum perineum, inner parts of the thigh, hams, arms, &c., in a young man labouring under scarlatina, when at its acme, the parts were bathed with a lotion of your Chloride of Soda, in the proportion of one fluid ounce to a wine quart of water; and in twenty-four hours he was comparatively well. The first effect was, the removal of the effluvia; and in forty-eight hours, the excoriations were healed in every part.

In another case of a child, the excoriations, arising from the irritation of purulent discharge from the prepuce, were quickly cured by a lotion, of 6 fluid drachms of the Chloride of Soda and 5 fluid ounces of distilled water.

In a case of sphacelated tongue, the Chloride of Soda was most advantageously applied.

A case of profuse ptyalism, with a most dreadful state of ulceration of the cheeks, gums, &c., was speedily relieved by a lotion, of 1 fluid ounce of the Chloride of Soda and 7 fluid ounces of distilled water.

In a deplorable state of the throat, after scarlatina, accompanied by secondary fever, no doubt arising from the state of the fauces, with loss of power to articulate;---after a few applications of a lotion, of 1 fluid ounce of the Chloride of Soda and 7 fluid ounces of distilled water, the patient could make himself understood.

In an instance of a bite from a bug on the neck, the undiluted solution proved instantaneously efficacious, although the neck was so extensively inflamed as to produce stiffness.

In a case of a bite from a horse, on the fleshy part of the fore-arm, there were extensive compression and abrasion of the skin;---a lotion, of 1 fluid ounce of the Chloride of Soda and 3 fluid ounces of distilled water, effected a cure in the course of thirty-six hours: the patient, moreover, in a very indifferent state of health.

The undiluted Chloride of Soda was applied but one night to the chilblains of my little girl, and she has not felt them since; but they were not very extensive.---The slightly stimulating---and at the same time cooling---effect from the preparation, would naturally suggest itself as highly useful in such cases.

In irritable piles, it has proved, in a patient of mine, of the most marked advantage. I am using it in another case, of long standing, where the protruding pile is divested of its cuticle.

I am informed by a friend, that he has used the Chloride of Soda, diluted, in a case where the membrane (and perhaps coagulæ) was retained after parturition, causing the most offensive smell: the effect of the solution, after a few injections, astonished him.

The use of the Chloride of Soda has been recommended by a German, in purulent opthalmia.

Extract from a letter received from R. Strange, Esq. Surgeon to the H. C. S. Charles Grant, *dated, May* 3*d*, 1828.

My opinion of the Chloride of Lime, is simply this: as far as correcting smells goes, I consider it invaluable; and Mr. Fincham deserves the thanks of every medical man, for having pointed out a form in which Chlorine may be conveyed to such a distance, and procured at so little expense.

Medical men are still totally in the dark as to the properties of infection and contagion; and I dare not presume to give my opinion as to the power which Chlorine may possess of destroying these; but, as I said before, its power of correcting bad smells, and of sweetening air which has been contaminated by a number of people confined together, renders it extremely valuable on board ship.---There are many ways in which the Chloride of Lime might be beneficially employed in India, independent of its virtues in correcting vitiated air.

The Chloride of Soda has very deservedly obtained great praise as a remedy for ulcerated sore mouth, produced by mercury. The rapidity with which diseases run their course in hot climates, frequently obliges medical men to give mercury in very large quantities; and they sometimes produce a degree of salivation, and a state of ulceration of the mouth and tongue, painful beyond conception; as well as a smell so disagreeable, that the patient is really miserable. I have found a wash of Chloride of Soda beneficial beyond my utmost expectations, both in curing the sore mouth, and in correcting the bad smell of the patient's breath.

Dr. Brown, in 1823, employed Chlorine in solution, in cases of the scarlet-fever, he says with the utmost success. From a tea-spoonful to a table-spoonful is given every two or three hours, without the addition of any other substance. The solution should be fresh, and swallowed quickly to avoid coughing: in the sore throat sometimes accompanying the fever, it is more easily swallowed than mucilaginous drinks. As the disease declines, the quantity of medicine is diminished: the whole quantity in the cases of children has never exceeded two ounces; and in adults, five ounces.

The following Cases are extracted from Dr. Robert Reid's valuable Pamphlet, entitled, " Clinical Observations on the efficacy of the Hydro-chloruret of Lime, as a Remedy in certain stages of Fever and Dysentery. Dublin. 1827."

The term *Hydro-chloruret of Lime,* is the French designation for *Chloride of Lime in solution.*

In the epidemic of the years 1817-18-19, many symptoms were observed, which seemed to indicate a tendency to generate a morbid poison. But I did not meet with the regular train of symptoms in any individal case, such as has occurred in the present fever. The generation of this morbid poison appears to take place at some uncertain period of the disease; and seems as if thrown on particular organs or parts exclusively, leaving all other parts of the body apparently in health. Probably, the peculiar state of the patient's constitution at the time, may determine the situation where the morbid change may be developed.

Aware of such a tendency in the prevailing fever, I have been enabled, in many instances, to obviate impending destruction, by the timely application of usual remedies. Many cases, however, occurred, in which the disease took its course with such rapidity, that time was not allowed for the remedies to come into operation before the fatal event took place.

Upon deeply considering these circumstances, it appeared to me, that some remedy was yet wanting in the treatment of this fever, which could act in such a manner as to prevent the formation of a morbid poison; or, when such an event had taken place, might be sufficiently efficacious in destroying its noxious qualities, as to render it incapable of deranging the powers of life.

From the accounts lately published respecting the influence which the Hydro-chloruret of Lime has evinced in destroying animal effluvia, I was induced to try the efficacy of this substance in neutralizing the morbid poison generated in the prevailing fever, if such were really the fact.

I determined to try the Hydro-chloruret of Lime, first with patients who had no prospect of surviving their disease under the ordinary mode of treatment; and in the manner least liable to produce injurious effects, should it possess any deleterious property.

When I had resolved to put the powers of this remedy to the test of experience, a case presented itself which was quite past all ordinary mode of treatment, but the circumstances of which demanded the interference of the medical attendant:

John Coyne was admitted into the hospital in the last stage of dysentery, which came on after a tedious fever. The discharges consisted of a bloody sanies, intermixed with a dark coloured matter, the smell of which was quite overpowering and offensive. The stools were passed involuntarily, and the patient was reduced to an idiotic state. I considered that erosion of the intestines had taken place, so that his death was inevitable. I directed ten grains of the Hydrochloruret of Lime to be added to the common enema of the pharmacopeia, and to be administered to the patient night and morning. The stench, which was so intolerable, was soon corrected; the evacuations became more natural in appearance; and pure blood was sometimes discharged. His tongue became clean and grew moist, but exhaustion continued to increase; notwithstanding which, he survived a fortnight after his admission.

Being satisfied as to the beneficial effect of the Hydro-chloruret of Lime in the above case, I directed similar injections for Rose Macnamara, who was labouring under dysentery after fever, in the female convalescent ward. On the 11th of November, 1826, the stench from the incessant discharges from her bowels was so intolerable, that the other patients declared they could not continue in the ward. The pain she suffered was at times excruciating. The first day after the injections with the Hydro-chloruret were employed, the patient experienced considerable relief of all the symptoms; in a few days the fœtor was corrected; the progress of the cure was gradual and steady; and she was discharged well, on the 6th of December: she has continued perfectly well to the present moment.

James Heron, a very old man, and apparently of a broken down constitution, was admitted on the 22d of March, affected with dysentery. He had frequent evacuations, occasionally mixed with blood, and attended with great pain in the abdomen. Tongue extremely loaded; urgent thirst; great debility; some appetite. He became convalescent from a tedious and severe fever, on the 20th of February. The dysenteric symptoms came on soon afterwards, and progressively increased up to the present time. I directed a mixture with acetate of ammonia and camphorated tincture of opium; but not finding any relief from this treatment, I directed, on the 24th, a mixture, consisting of ten grains of the Hydro-chloruret of Lime with two drachms of tincture of colombo, in four ounces of water and two drachms of syrup: half an ounce to be taken every hour.---25th: His tongue began to get moist, though still loaded with brown fur. Perstet.---26th: Tongue cleansing; evacuations changing to a more natural appearance. He has not occasion to go to the chair more than eight or ten times in the twenty-four hours; longer intervals from pain, but at times he thinks it more severe than before. Perstet.---27th: Feels better in all respects; tongue cleansing. Let him take his mixture only every third hour.---28th: No pain since last visit; was up but four times; evacuations nearly natural; says, he feels himself almost well. Let him take his mixture only night and morning.---29th: Convalescent.---31st: Discharged cured; and he says, he has not felt himself so well in health for many years.

I have selected these cases of dysentery from a number of others, as being the most distinctly marked examples of the disease. Such cases would, in all probability, have proved fatal under any treatment which has heretofore been adopted, in a disease which is, in such advanced stages, so generally intractable.

I shall now proceed to detail a few examples of the efficacy of the Hydro-chloruret of Lime, in some stages of fever:

Benjamin Hepinstall was two days ill of fever. On his admission, the 13th of March, he complained of pain in the abdomen, which was extremely tender on pressure, and he exhibited an expression of considerable anxiety: these symptoms being relieved, his head became much affected. On the 18th he was apparently convalescent. On the 19th, however, the ganglionic disease again made its appearance. The former treatment was adopted, and leeches were applied to the abdomen, without apparently having any efficacy towards arresting the progress of the disease. On the 22d, he lay on his back. There was almost total prostration of strength; pulse scarcely perceptible; occasional cough; the entire surface of the body, limbs, and tunica albugenea of the eyes, of a dirty yellow colour; a dull purple circumscribed colour in the cheeks; tongue dry and loaded.

Considering this patient in a proper stage of the disease to derive benefit from the Hydro-chloruret of Lime, a mixture with this medicine was directed to be taken three times a day.---23d: After taking the medicine three times yesterday, he had a quiet night; slept well. Tongue now cleansing and moist; yellowness of the skin not apparently changed, but the purple flush has disappeared from his cheeks; pulse full and calm. He continued to mend steadily under this treatment until the 26th, when all symptoms of ganglionic disease being now gone, his pulse was become spinal, and be complained of great pain in his back. Finding that the mixture with Hydro-chloruret of Lime had apparently no effect upon these symptoms, I reverted to the usual treatment in such cases; and on the 31st of March, he was discharged cured.

Ann Lenon was admitted into the fever-ward No. 5, on the 7th of February, 1827. She complained of great headache, pain in her bowels, and other febrile symptoms, in such severity, as to require to be bled largely on two successive days. It would be unnecessary to detail the treatment up to the 17th of March: it was varied, accordingly as the circumstances of the case appeared to require. No plan of treatment, however, which I put in force, appeared to have any influence in arresting the progress of the disease. On the 24th of March, the state of her case was as follows: she had rigour every day since the 17th; voice and appetite almost gone; mucous rattle in breathing; could take no food, but had constant thirst, which she attempted to relieve by supping cold water; expectoration thick, and got up with difficulty; cheeks bloated with purple hue; tongue furred.---On the 25th, I directed the mixture with Hydro-chloruret of Lime, every second hour.---29th: She appeared to get better on the 26th, and continued steadily to improve:

her appetite was returning; her tongue was clean and moist; and since the 25th, she had not a rigor. Having persevered in the same treatment a few days longer, and all the bad symptoms having apparently subsided, I thought it advisable to diminish the quantity of the mixture to one dose daily. She soon, however, changed for the worse; the bad symptoms threatened to return; and I found it necessary again to direct the medicine three times a-day. This I continued till I supposed all danger of relapse was over; and on the 3rd of April, her convalescence was complete.

I have selected the foregoing cases from a great number, as being those in which the evidences of the efficacy of the Hydro-chloruret of Lime were most unequivocal. From attentive observation, relative to the mode of action of this remedy, I am induced to consider it astringent in its primary local action, without apparently exciting inflammation. In certain stages of dysentery, therefore, it will be found of the highest importance. The cases of Rose Macnamara and Heron, evince its powerful efficacy in that stage of the disease which has been heretofore so tedious and intractable. As to its secondary influence, it seems to produce very general effects upon the functions of the ganglionic system, principally evident in correcting the formation of morbid matter. In some cases, it appears to act as a diuretic: the urine, however, when increased in quanity under its influence, appears to be of that kind which was formerly supposed to indicate a termination of disease; thus agreeing in its effect with the observation of Hippocrates, "*cocta non cruda sunt evacuanda.*" More frequently, perspiration seems to be its most evident effect: in such case, also, the same observation is fully applicable; as the perspiration is seldom profuse, but always of that healthy feel which has been usually considered by the physician as the most satisfactory solution of a severe disease.

From the observations I have made of the efficacy of this medicine, in cases which exhibited all the symptoms of that severe disease which medical writers have denominated yellow fever, I can, with some confidence, recommend it as a valuable remedy. Indeed, the cases to which I at present allude, having had all the symptoms of that formidable disease which the difference of climate in these countries could admit, I am induced to expect, that, when properly employed, the Hydro-chloruret of Lime will be found as valuable a remedy in the treatment of yellow fever, as mercury has proved in syphilitic disorders.

When a remedy has been found very efficacious in some states of disease, the practitioner, by not carefully observing its operation in the animal economy, is induced to appropriate the medicine rather to the name of the disease as known to nosologists, than to the morbid actions which the remedy is peculiarly adapted to correct.

The practitioner, therefore, should be careful not to expect too much from any single remedy; for the records of medicine show, how many substances have been at times lost to the physician, and at other periods proving of the highest value in the science of medicine.

The following Extracts, from Mr. Scott and Mr. Alcock's translation of a Treatise on the use of the Chloruret or Chloride of Lime, *by M. Labarraque, shew its early introduction into France, and the purposes to which it has been so successfully applied in that country; for which, M. Labarraque received the first prize of the Royal Institute, in June,* 1825.

Reiterated experience has shewn, that the Chloride of Lime, mixed with water, has the property of disinfecting the atmosphere, and of impeding putrefaction in a sensible degree. And I have had the satisfaction of seeing decomposition in the living subject corrected, by the employment of Chloride of Soda on wounds: thus, carbuncle has been stopped in its ravages, and cured; the most intense hospital gangrene, ill-conditioned venereal ulcers, and, in short, gangrenous sores of the worst characters, have been speedily brought to cicatrization. The fœtid discharge of cancer is corrected by this preparation; and its good effects upon this frightful malady, as well as upon herpes ulceratia, continue to be experienced. Observations on the cure of porrigo favosa, have also been communicated to the Royal Academy of Medicine.

In fine, we may deduce, from all that has been observed on the use of the Chloride of Soda upon man, that this liquid is capable of removing the fœtor of sores, of changing their nature, and making them pass into a state of simple ulceration; that it is, above all, efficacious in atonic ulcers, hospital gangrene, mortification, &c. It is used pure, or mixed with one, two, or as far as eight parts of water, in the form of lotion; and care should be taken, that the wounds are covered with lint moistened with this liquid. The dressing should be removed twice a-day, and its use suspended when the sore becomes red and inflamed: the applications then necessary, being such as are usually directed in surgical books.

For ulcers of the uterus, the Chloride of Soda should be diluted with twelve, or fifteen, or even thirty times its weight of pure water, and used as an injection. Prudence recommends that its use should be directed by a professional man, who will increase or moderate its action, or even suspend it, if requisite.

The Chloride of *Soda* is that which I have used on man: the action of Chloride of Lime is not equally efficacious, though its disinfecting property is the same: for example, it is certain of destroying the miasm which developes itself in the apartments of persons affected by diseases of a bad character, if the chambers be sprinkled with either of the liquid Chlorides well diluted with pure water, or by putting it on a plate which is to be placed in the chamber of the sick person; the Chloride is to be renewed morning and evening, or whenever it shall have lost its peculiar fumigating character.

Physicians or others attending persons affected with contagious disorder, will derive great advantage, if they are attentive to breathe it when approaching their patients; moistening their hands with it, and causing it to be sprinkled on the floor, particularly round the bed.

Professor Marjolin, chief surgeon at Beaujon Hospital, used the Chloride of Soda in gangrenous affections, whether it succeeded amputation of a limb, or any other cause. He observed that the slough was quickly detached, and the disease checked, in the greater number of cases.

Dr. Sègalas, one of the professors of the faculty of medicine, after a course of experiments, remarked, more than two years since, that "the application of the Chloride upon denuded tissues, especially its injection into the genitals, requires great caution. Diluted with water, it is less irritating, and does not lose any of those valuable qualities which place it among our energetic medicines. In the case of a man affected with gangrene, in consequence of infiltration of urine; the scrotum was distended with urine to five times its natural size; at the lower part, sphacelation extended, elliptically, four inches in the course of the raphe, and from two to two and a half inches in breadth. I incised deeply the slough, leaving it projecting from the edges of the wound, and passed a small sound into the urethra. I then applied, to the dead parts, a lotion of the Chloride of Soda in its pure state. The place, the bed, and the chamber, were purified (disinfectés) in an instant. I finished with a dressing of lint, impregnated with the same liquor diluted in four parts of water. The next morning, to my great satisfaction, I found many sloughs detached, and the patient in an improved condition. I repeated the dressing of the preceding day, and in the evening the wound was sensible (vive) over the whole surface. I therefore discontinued the use of the Chloride; and ten days after, the sore was completely healed."

M. Samson, surgeon (ordinaire) at the Hotel Dieu, has disinfected ulcerations of the mouth, with caries of the palate, and suspended for some time the ravages of this frightful disorder. The same surgeon, after having, in the presence of Dr. Lefevre, put a ligature upon a large uterine polypus, discovered that putrefaction had commenced in it: he accomplished its disinfection by the application of diluted Chloride, and the mortified part was detached. The operation was attended with success.

Dr. Lagneau has used the Chlorides as an injection, for spongy and ulcerated gums, exhaling much fœtor. The state of the patient was improved, and after each injection the fœtor was destroyed. M. Regnard, dentist, was anxious to apply the Chloride of Soda in stopping caries of the teeth, and removing fœtid breath; but observed that this medicine disagreeably excited the salivary glands, from which he thought it could not be admitted to the toilette as an application for the mouth.

Dr. Chantourelle treated two cases of cynanche maligna, with the Chloride of Soda diluted in ten parts of water; and the fœtor, so dangerous to the attendants and physician, was destroyed. These cases were communicated to the Society of Medicine at Paris. More recently, he has been again successful in administering the Chloride, in the dose of twenty-five drops in a glass of water, for removing the hydro-sulphuric gas, which severely affected a person who had been poisoned by the hydro-sulphuret of potass, after the latter had been expelled by vomiting. His memoir, read at the Royal Academy of Medicine, gave rise to a learned report.

A very remarkable fact was observed, in a case of asphyxia presenting the most serious tetanic symptoms: the patient was restored by breathing the Chloride of Soda.

The good effect of Chloride of Lime, in cases of burns, is confirmed by the experience of M. Fisfranc. He has applied it in many cases of that kind, sometimes immediately after the accident, sometimes after the application of emollient cataplasms. Lint is moistened in a solution more or less strong of Chloride of Lime, and then applied to the place, being covered over with waxed cloth. The cure has been singularly hastened under its influence; and in one case, where almost the whole of the lower limbs, the arms, and face, had been burnt, the use of the Chloride recovered the patient from the stupor into which he had fallen, at the end of four days; and a perfect recovery was effected two months after the accident.

Ulcer of the noze (l'ozìne) has been disinfected, by injections, used twice a-day, of the Chloride of Soda diluted with from two to ten parts of water; and this fœtid ulcer cured.

In certain disorders of the bladder, the urine becomes offensive and disgusts the patient: the disinfection is accomplished, by placing a few drops of the concentrated Chloride of Soda in the chamber-pot. The same result may be produced on urine scented by eating asparagus: in this case, it is necessary to use a greater quantity of the Chloride.

M. G. aged 69, affected with paralysis of the bladder, and unable to pass his urine by voluntary efforts, had suffered for several days the painful effects of distension of the bladder. The hypogastric region was swollen and painful; the urine, turbid and smelling of ammonia, deposited a thick brown and fœtid pus; the tongue, dry; the skin, hot; the breathing, oppressed; the voice, hoarse and feeble; there was much nervous irritation, accompanied at times by delirium.

M. Sègalas had recourse to the Chloride of Soda diluted in sixty parts of water throwing it into the bladder by means of the double catheter. The first injection produced a dimunition, very remarkable, in the secretion and odour of the pus; a second, performed forty-eight hours after, was followed by a similar success; and two more injections, performed at an interval of two days, placed the patient in a state to attend his occupation, by using the catheter to draw off the water. He did not experience the slightest ill effects, during the use of the Chloride thus diluted. The destruction of other noxious principles is effected by the application of the Chloride, but my experience does not yet allow me to assert it as a fact.

The linen and pledgets of lint, which have been used for dressing fœtid sores, retain their odour for a long time, and contribute to the insalubrity of the room where they are placed. By pouring a glass of the concentrated Chloride into ten pints of water, and soaking the linen in this liquid, they may be withdrawn immediately, for they will have lost their odour.

The Chloride of Soda, diluted in twenty-five or thirty parts of water, has been employed with success in disinfecting and preserving subjects in dissecting-rooms: this operation is performed by means of a tin watering-pot, containing about six quarts, which is to be filled with diluted Chloride; the fœtid body is to be sprinkled twice a-day, and the surface afterwards brushed and washed with clear water. The moment the chemical preparation comes in contact with the body, the effluvium is destroyed, and the impregnated air instantly corrected.

It will not be out of place here, to report the experiments made, during two nights, at Bicêtre, in eight crowded and unwholesome apartments. These rooms, to the great satisfaction of the patients and the physician who attends, have been completely purified, by one sprinkling, with a bottle of concentrated Chloride diluted in thirty parts of water: the rest of the liquid served to disinfect the cisterns, water-closets, &c.

It may easily be conceived, that this mode of purifying places inhabited by a vast number of individuals, is very simple, and but little expensive; and may therefore be rendered of important utility, in being used in barracks, military hospitals, &c.

The Chloride of Lime will be found equally advantageous for purifying corrupted water; and to effect this, one or two ounces is required to a hogshead of the impure water: what I now advance, was demonstrated at the beginning of the year 1824, to M. Kerandreu, Inspector-general of the Health of Seamen, who, at this time, was charged by the Minister of Marine to make a report of my propositions, the subject of which was the purification of his majesty's navy,---propositions which were adopted, and which I shall make known elsewhere. Dr. Marc, member of the Royal Academy of Medicine, who, in 1823, was appointed, by the Council of Health, to assist at my experiments on animal matter, water-closets, &c.; and was one of the first who saw the whole of the applications, desired much to be present at this experiment of disinfecting water. The Chloride of Lime is previously dissolved in water, and added a little at a time, stirring the impure water until the disinfection is complete. If the Chloride predominates, it is merely necessary to expose the water, thus purified, for a few minutes to the air, and then filter it or let it subside, when it is potable. It may easily be conceived of what utility this must be, either at sea, or in marshy countries where the water is unwholesome; or in places where persons are reduced to the necessity of drinking water from cisterns, which is frequently impure.

It appears to me very desirable, to recommend patients to breathe the Chlorides of Soda and Lime, in all cases of asphixia, occasioned by sewers and privies, even long after the occurrence of the accident, should they still find themselves under the influence of the deleterious gas.

ON THE USE OF THE CHLORIDE OF LIME, ON BOARD SHIP.

The following Instructions, for this particular purpose, were transmitted to the Honourable Commissioners of his Majesty's Navy, and generally circulated amongst the private Ship-Owners, in the early part of 1827.

Directions:---To one pound of the powder, add, gradually, five gallons of fresh or sea water; break all the lumps; mix it well; allow it to settle; and the liquid is then fit for use.

THIS valuable preparation will prove of the utmost importance to the preservation of health, on board ship, and in places exposed to noxious atmospheres. It corrects all offensive and putrid effluvia; purifies the air in close and confined situations; and destroys the germ of infectious diseases.

Noxious exhalations from the low and marshy shores of most harbours and rivers in warm climates, are the well-known cause of most fatal diseases on board ship: these may, undoubtedly, be prevented, in most instances, by sprinkling the decks, morning and evening, with the liquid, and suspending some of the powder in buckets, between decks, during the night.

Where small-pox, measles, cholera-morbus, scarlet, typhus, and yellow-fever prevail;---the greatest benefit will result from sprinkling the liquid about the apartments of the sick,---suspending the use when the smell becomes perceptible; and from immersing in it, for a few minutes, and rinsing in pure water, the linen &c. of patients, before being sent to wash. When death takes place, the body will be preserved for a considerable time from putrefaction, by washing and covering it with a cloth kept moist with the liquid.

The water of many rivers and places (for instance, Angier) is often impregnated with substances highly prejudicial to health: to guard against which, the water-casks ought never to be filled without mixing about a quarter of a pound of the powder with one or two gallons of water, and pouring the mixture into a puncheon of 120 gallons. Bad water may, at any time, be rendered sweet, by the same means.

The stench arising from bilge-water is not only a source of great discomfort, but it discolours the paint, injures the timbers, and sometimes occasions disease. It will be effectually removed, by mixing half a pound of the powder in a bucket of sea water, and throwing one or more down the pump-well till the smell ceases. The sick-births, quarter-galleries, &c., will be almost instantly purified, by sprinkling them with a small quantity of the liquid. The smell of newly-painted cabins will be obviated by the same means. A wine-glassful put into water-closets, night-chairs, or bed-pans, will prevent all effluvia.

Tainted meat, fish, &c., will be divested of all smell, and fresh meat may be kept much longer, in the warmest weather, *without the slightest injury to its quality or taste,* if sprinkled with or dipped into the diluted liquid, at intervals, and suspended in the air; and no flies will touch it.

It will be found essentially to promote the health and comfort of troops and convicts, on board ship, if, with the usual attention to fresh air and cleanliness, the liquid be occasionally sprinkled, during the day, about the orlop deck. For the purposes of fumigation, it is only necessary to add a few ounces of diluted sulphuric-acid to a bucketful of the liquid.

After discharging cargo, the greatest advantage will be derived from white-washing the hold, with one pound of powder to a gallon of water. At the same time that this purifies the hold of the vessel, and destroys insects and vermin;---the result of various experiments warrants the conclusion, that it will not only prevent, but even arrest, the progress of dry-rot.

The life of a sailor is one of continued privation and exposure, in every variety of climate; and its preservation, of paramount importance to the safety of his vessel. The application, therefore, of a means so simple and effectual as the Chloride of Lime, in promoting health and comfort on board ship, is dictated alike by humanity and policy.

In the East and West Indies, on the coast of Africa, and in many other parts of the world, "miasma, arising from moist vegetable matter, in an unknown state of decomposition, produce fevers and dysentery, and extend their pestilential influence to vessels at a considerable distance from the shore."* It is not to be expected, that *in every instance* the baleful effects of noxious vapours from the land can be obviated by the means suggested: as the breeze which wafts the poison may, at the same time, remove the Chlorine that would destroy it; and sailors are called on duty in situations where it is impossible to be employed. Where, however, it cannot prevent disease, it may ameliorate the symptoms;

---

* "Chlorine has no action on *pure* air; but if impure animal or vegetable substances are suspended in it, Chlorine acts upon and destroys them."—*Thenard.*

and the use of Chloride of Lime is, beyond all doubt, the most effectual and economical precaution which can be taken, with this exception: to anchor windward of low and marshy shores, where it is possible and safe; or if this is not practicable, to lie at the greatest distance from them. "The virus of the plague, small-pox, measles, and other infectious fevers, operates at a much more limited distance, through the intermedium of the atmosphere, than marsh miasma;"* and on board ship, escape is almost impossible, when these destructive diseases make their appearance. Experience alone can prove the full benefit to be derived from the use of the Chloride of Lime, under such distressing circumstances: but no situation can be imagined, in which its disinfecting properties could be more beneficially employed.

In purifying water, the quantity to be used must, of course, depend upon the comparatively good or bad quality of the water; but if a few ounces be added when the water-casks are filled, no taste of the Chloride will remain when required for use; or if it should, exposure to the air will remove it. The most stinking muddy water will be rendered sweet and clear, by mixing a small quantity of the clear liquid Chloride of Lime with it; and a few drops stirred in a wine-glassful of apparently pure water, will make it cloudy, and form a precipitate in a short time, if any foreign substances are present: it is, therefore, a good test for the purity of water.

---

* "Chlorine is the most efficacious fumigation to destroy these gasiform poisons."—*Dr. Ure.*

TESTIMONIES

ON THE USE OF THE CHLORIDE OF LIME, ON BOARD SHIP.

Certificate, from A. Robertson, Esq. R.N., *dated,* Canada *Hospital Ship, Chatham, March* 10*th,* 1827.

I EMPLOY the Chloride of Lime, as prepared by *Mr. Frederic Fincham,* of Manchester, in every case of disease in which the effluvia are offensive: to correct the immediate atmosphere of all infectious complaints; to purify the privies, close-stools, bed-pans, and bed-linen, of sick patients; and to destroy the smell of bilge-water.

It is the most powerful and safe disinfecting agent with which I am acquainted; and ought to be constantly kept on board all vessels, whether of the royal navy or merchants' service.

Extract of a letter, from the same, dated, Chatham, September 9*th,* 1827.

My experience of the Chloride of Lime, as a disinfector, continues to justify the first sanguine expectation I had formed of it; and it has not failed in any instance.

H. M. S. *Clio,* being over-run with mice, and contaminated with their smell, to such a degree as to render it painful to be on board; I had the decks, cupboards, and cabins, sprinkled with the solution. The smell was greatly lessened, but as it did not reach the animals themselves, it was not quite destroyed. I therefore directed the removal of her sheathing, took advantage of her crew being hulked in another vessel, and fumigated her with the Chloride and diluted sulphuric-acid, with the happiest result.

The following Extract from a Brussels Paper, is a correct account of the application of the Chloride of Lime, *in March*, 1827, *on board the* Argonaut *Hospital Ship lying at Chatham, under the direction of Dr. Burnett, Medical Commissioner.*

We have recently learned some particulars of the experiments made with the Chloride, on board of the *Argonaut* hospital ship; of which, as they may lead to most beneficial results, we hasten to give a few extracts: a pipkin, containing a few ounces of the solution of the Chloride, (the cost of which does not exceed two-pence,) applied in any place where a putrescent smell has become insufferable, will have the effect of completely purifying the air. A solution of the same nature has been used on board the *Argonaut*, as a topical application for arresting the decomposition of animal matter in foul ulcers, &c., with the most decided advantage: thirty Dutch patients were on the orlop deck of the *Argonaut*, at Sheerness, afflicted with dysentery of a very aggravated nature; and one-half of that number with frost-bitten and gangrenous feet; yet, after sprinkling the deck twice or thrice a-day, with a solution of the Chloride, the most fastidious might have visited the deck without discovering any unpleasant effluvia. The solution may be employed with the greatest effect in private houses, either in sick chambers or generally, wherever an offensive smell prevails.

Copy of a Report, on the use of the Chloride of Lime, *addressed to George Clay, Esq., Owner of the Hon. East India Company's Ship* Windsor.

H. C. S. *Windsor, May 25th,* 1828.

SIR:

In obedience to your request, I have paid particular attention to the effect produced by the application of the Chloride of Lime, when employed for the purpose of destroying unwholesome effluvia between decks; and I am happy to add, that in my opinion it has been attended with the most beneficial results. We commenced the use of it as we approached the warm latitudes, sprinkling the orlop deck with the solution, prepared according to the printed instructions, twice a-week, increasing in frequency when the heat was peculiarly oppressive; and it completely succeeded in removing the disagreeable close smell, which always prevails when a number of persons are confined in a limited circulation of air. And I think I am warranted in attributing the extraordinary state of health which the troops enjoyed, to the use of this admirable discovery;---especially, as, by communicating with the surgeons of several of the Indiamen, having charge of even a less number of troops, but with only the ordinary means of fumigation, I have learnt, that sickness (especially bowel complaints, to which their confined situation more peculiarly exposes them) was very prevalent this season. On the other hand, the deaths on board the *Windsor*, during the outward-bound passage, were merely two children, and those during the rough weather in the Bay;---a circumstance, I believe, almost unexampled; and which, I think, must have been owing, in some degree, to the effects of the Chloride of Lime.

I come now to its use in preventing the ill effects of the miasmata, arising from the decomposition of vegetable matter on shore; to which cause, I believe it is pretty generally agreed, the fatal bowel complaint of hot climates is chiefly owing. And here, I think, we had a very fair opportunity of estimating its advantages: during our stay at Sawgor, the gun-deck was regularly sprinkled, morning and evening, with the solution, and the residue allowed to remain; and this must have contributed to the singular good health our people enjoyed, when compared to the other ships; as, during the time the cholera was raging, (about ten days, and evidently arising from atmospheric influence, the wind being off shore the whole time,) our deaths were confined to two, and we left Sawgor with a single man on the list; whilst in one alone of the other ships, the deaths during the same period amounted to eleven; and I know that the sick-list of another which sailed in company with us included thirty, and mostly with dysentery. In our passage through the Straits, we used it occasionally; and in China, returned to its daily use, as in Bengal: and, whether owing to its use or to some other cause, we remained, during our stay, entirely free from intermittent fevers and dysentery, which are the prevailing diseases there, and which arise exclusively---at least the first---from marsh miasma. At the same time, other vessels in the Reach were suffering severely from cholera, and other bowel complaints.

With regard to its operation in purifying water, I regret that I have not had the means of ascertaining its properties, as our water has been particularly good throughout the voyage. I made the experiment on the water of one butt outward bound, with the smallest quantity Mr. Fincham mentions; and, though it certainly removed the smell, I thought it imparted an unpleasant taste: but as this was the only trial I had an opportunity of making, I am unable to state what would be the effect of a smaller quantity.

I believe these are all the facts I have been able to collect, relative to its general use, but I have found it of incalculable service in its minor properties. I have found it of infinite use in removing the close smell of a sick birth ; and I have also employed the solution as a gargle, in cases of excessive salivation, with the happiest result; but the case in which I found it of the greatest value, was one of a sloughing wound, where, after all the ordinary remedies had failed, it speedily put a stop to the sloughing process, and induced the sore to put on a healthy appearance.

Viewing it under all these circumstances, I cannot but think that you have rendered an especial service to the *Windsor*, and to vessels in general, by introducing into notice so valuable a means of destroying offensive effluvia; as I am convinced, it adds materially to the comfort of the ship, and the safety of the people. At the same time, its means of application are so simple, and so far from the inconvenience attending the ordinary means of fumigation on board ship, that I think, when known, it cannot fail to come into general use: more especially, when to this is added the economy attending it; as I have always found a pound of the powder sufficient to destroy all effluvia in both decks,---and even at times the gas was in excess from this quantity.

I am, Sir,
Your most obedient Servant,
JOSEPH DOCKER, *Surgeon.*

N.B. The *Windsor* had above 500 souls on board.

Certificate, from A. F. Proctor, Esq. Commander of the H. C. S. Windsor.

I have read the foregoing Report, and entirely agree with Mr. Docker's statement.

Extract from a letter received from P. C. Friend, Esq. Commander of the Ada *West-Indiaman, dated, London, April 29th,* 1828.

In reply to your inquiries requesting my opinion of the Chloride of Lime, I have the pleasure to state to you, that I have found it answer the purposes as generally set forth in your circular. I have particularly experienced its advantages in our state-rooms, by its sensible effect on the effluvia arising from the sugar and bilge-water; and more so, from its rendering sweet and eatable, fresh meat in an advanced state of decomposition, by washing it with a weak solution of the composition.

It is decidedly a powerful disinfecting agent; and I cannot but recommend it to every ship, as a means---not only of adding to the comfort, but of preserving the health of the crew.

Extract from a letter received from Captain Richard Ainley, dated, Havanna, August 27th, 1827.

The brig has been very tight,---so much so, that I had frequently to make use of the disinfecting powder, to take away the smell; which was so extremely bad, that the paint in the cabin became quite black: and I had the pleasure to find it answer the purpose perfectly, in the course of half an hour.

The disinfecting powder is, I am of opinion, a most excellent thing on board any ship. I have made use of it in all parts of the ship, since I came into warm weather, with the most satisfactory results.

ON THE APPLICATION OF THE CHLORIDE OF LIME TO VEGETABLE SUBSTANCES.

Copy of a Paper addressed to the Medico-Botanical Society of London, which was read at the last general meeting of the society, held, November 9th, 1827.

THE following experiments upon vegetable substances with the Chloride of Lime, are only the commencement of a series, which will require time and patient investigation to mature; but I am induced to submit them to the consideration of the Medico-Botanical Society, in the hope and expectation that others more capable, and with greater opportunities for the investigation, may prosecute the inquiry. My attention was first directed to the subject, from the experience of its powerful antiseptic properties, as applied to animal substances;* and from the fact, that flies would not remain on any which had been sprinkled with it. The ultimate constituent principles of animal and vegetable substances being so very similar, and the decomposition of both being accelerated by the same causes;---I was led to think, that the Chloride of Lime would as effectually preserve the one as the other. By the prevention, also, of insects depositing their ovæ at the roots, and between the bark and the wood, one cause of destruction might be removed, in the same manner as meat would be preserved from being fly-blown; and the following experiments appear to justify my opinion:

---

* A cod-fish was dipped six times in a weak solution of the Chloride of Lime, and dried in the air between each immersion ; a piece of mutton, in a stinking state, was served the same. Fifteen months have elapsed, and both are in a state of perfect preservation : the fish quite dry, like Norway ling ; and the mutton free from taint, but the fat rather tallowy.

Some gooseberry-trees which were covered with caterpillars were watered with the Chloride of Lime, and others not: the former were freed from them without injury to the tree; the latter had scarcely a leaf left upon them. My rose-trees were covered with green lice: those watered with the Chloride of Lime were freed from them, and produced abundantly; those which were not so watered, were blighted. A cherry-tree, of which one-half was dead, I found to be infested with grubs and insects between the bark and the wood; I washed it well with the Chloride of Lime, and poured some into every hole and crevice; the insects soon disappeared, and the tree threw out gum of which there was previously no appearance, although there was fruit on the live part of the tree.---No conclusion can be drawn from this instance until next year; when, if the tree bear fruit, I should conceive that it will be evidence of some good having been done, as I think it must otherwise die, from the very small portion of bark which remains entire.

Distrusting my own experience, I induced a skilful gardener to make some experiments; and he reports having used it most effectually for the destruction or prevention of insects, on young carrots, cauliflowers, and even upon his green-house plants, but considers it too powerful for some of a more delicate nature. A parcel of turnip-seed was divided into equal parts,---one steeped in the Chloride of Lime 36 hours, the other not; both were sown in the same soil and aspect; the former came up in half the time of the other, and the produce was more than double; no fly ever attacked the plants, and the leaves were greener and fresher. The mere steeping of seed has been, I believe, generally practised with good effect; and further experiments must determine the relative value of steeping in Chloride, and salt or fresh water. The proportions used by me have been, one pound of the Chloride of Lime to five gallons of water, which I should recommend to be strictly adhered to, as the safest; and on the appearance of blight, let the trees or plants be watered freely from an engine or pot.

On grasses, it appears to act too powerfully; and I failed in destroying the black insect on bean-plants. From the nature of the fungi tribe, and their thriving in soil and situations where hydrogen is generated in quantity, I have no doubt, the use of the Chloride of Lime will prove their destruction. I have been led more particularly to the investigation of this part of the subject, in my experiments for the prevention of the rot in timber, which I found to be invariably accompanied, in one or other of the stages, by the production of fungus. I had pieces of elm, oak, and willow, cut into halves: one piece of each I steeped in Chloride of Lime, the other not. I placed them all in a coal-pit, where timber is always rapidly destroyed, by the accelerating causes of moisture, heat, and confined air. Some months have elapsed, and the present appearance is all that I could wish in favour of the good effect of the steeping in Chloride of Lime; as the pieces done with it are in good preservation; but the others are beginning to shew mouldiness. Upon pieces of timber where there is incipient rot, I can immediately detect it, by washing them with the Chloride of Lime; as it bleaches the diseased parts, but leaves the sound untouched.

I should not wish to form any hasty conclusions upon a subject which has been hitherto involved in so much doubt and uncertainty; but from the fact of hydrogen, one of the constituent parts of vegetable matter, being evolved in its decomposition; and that timber grown in low and marshy ground, where hydrogen exists in quantity, is more liable to decay than timber grown in high and airy situations; the inference appears natural, that by the use of any substance which should neutralize it, there is the best chance of preventing rot in timber. Upon this principle, I have not hesitated to recommend to the Commissioners of the Navy Board, to have the holds of His Majesty's ships washed with the Chloride of Lime, as it will answer the purpose of purifying the air in the ship, and so far also remove one cause of the disease in timber.

Before I conclude this paper, I must mention having seen, some years since, that M. Humbolt found steeping in aqueous Chlorine the best preservative of exotic seeds; and Sir H. Davy mentions, in his Agricultural Chemistry, having tried an experiment with it on vegetation, but found that the plants fell off after a short time: not having these authorities by me, I cannot give more details; but they are doubtless familiar to many of the society.

It will afford me great pleasure, if this paper should be found deserving of the attention of the society, and induce some of the members to prosecute the inquiry.

In the foregoing paper, I deferred to this season any decision as to the effect of the Chloride of Lime in stopping the decay of the cherry-tree; and the result appears conclusively in favour of the benefit derived from the application: as it has this year produced more fruit, in proportion, than any of the most healthy trees in my garden; a new bark has been thrown out in some parts, and it has remained free from insects. I have this year repeated the experiment on several other trees, with apparently equal success. But the good effect is most strikinglyevident on a young apple-tree, which was cankered at almost every junction of the branches with the stem, and the younger shoots with the branches; overrun with insects; and in some parts, with the smallest portion of bark remaining. In the spring, blossoms were put forth, but they soon fell off; and the few remaining leaves had a sickly appearance. In this state, I first applied, about a month ago, the Chloride of Lime, in the proportion of one pound of the powder to a gallon of water; and at this moment, there are fresh blossoms and shoots on every branch which has a connecting bark, and the tree is free from insects. Fresh blossoms, I am aware, are not of uncommon occurrence, where the first are prematurely blighted: but, without laying claim to any vegetative powers in the Chloride of Lime, it evidently exerts a beneficial influence, by destroying what would impede vegetation.

I shall adduce but one other instance of its action on living vegetable substances: many of the vines in a hot-house were old, and punctured by insects at the stems, which were in a state of decay. In the autumn of last year, the stems were washed with the Chloride of Lime, in the proportion of one pound of the powder to three gallons of water. When the vines were dressed, the parts cut were treated in the same way. In the first instance, the decay was stopped; and in the latter, the exudation turned to a blood-red colour. Although the vines were last year very productive, they are equally so this; there are no insects upon them, and the vines appear vigorous and healthy, without any fresh manure having been added to the soil.

From these facts, I think the inference may now be fairly drawn, that the Chloride of Lime arrests the progress of decay, destroys insects, and exerts no prejudicial influence on the living tree.

It only remains for me to mention the progress of my experiments in preventing the rot in timber: and I have to regret, that, from the accidental explosion of fire-damp in the coal-pit where I had placed the pieces of elm, oak, and willow, I am deprived of the experience which they would have afforded me. But other experiments have corroborated what I have before stated, and increased my confidence in the benefit to be derived from the use of the Chloride of Lime for this purpose.

If by the seasoning of timber is meant bringing it into a dry state, saturation with the Chloride of Lime effects this more equally than stove-drying, and without injury to the quality of the wood. In stove-drying, there is great uncertainty as to all the moisture being evaporated; for, on cutting open a piece of timber, it is frequently found wet at the heart, although the surface appears perfectly dry. If in that state it is put into a house or ship, the moisture will be again diffused through the timber, which will probably be more disposed to decay. The wood is also apt to warp in the stove, and will again imbibe moisture; and in the extreme heat, new and injurious combinations may be formed. I should therefore say, that seasoning in the open air, and in as low and equal a temperature as possible, is preferable to stove-drying. If timber is saturated with water previously to its seasoning, the juices, from being diluted, are more readily evaporated: it would therefore appear a good practice to saturate with water, and then evaporate it by exposure to air under cover.

Water is Nature's grand solvent; and to deprive substances of it, the best recipe for their preservation. By divesting timber of the sap and other juices, its decomposition is prevented: for it is only by the decomposition and recombination of these secretions, that fermentation, the acetous and putrefactive processes, successively ensue. The Chloride of Lime preserves green timber by entering into new combinations, of a permanent nature, with its juices; and *Chaptal* asserts, that by treating the juices of a number of plants with Chlorine, he uniformly precipitated an *insoluble* substance similar to woody fibre, which was neither affected by alkalies nor altered by keeping. The earlier, therefore, the Chloride of Lime is applied after the tree is cut down, the greater will be the benefit derived.

If a piece of timber is already attacked by rot, the application of the Chloride of Lime not only arrests its further progress, but prevents the disease spreading through the ship or building. This is an important point gained, for decay is infectious; and although it more immediately attacks wood in contact with it, yet it acts prejudicially in confined situations, such as the hold of a ship, by contaminating the atmosphere; and from being an effect becomes a cause.

Some insects appear to be directed by instinct to deposit the ovæ where decomposition is going on: in the first place, perhaps, to promote animation by the heat which is generated under such circumstances; and secondly, its affording an atmosphere congenial to the living larvæ or insects. If decomposition is stopped, the inducement for insects so to deposit their ovæ is removed, and the wood preserved from their ravages. The Chloride does not appear to act equally upon every species of insects, but to be most obnoxious to those which are engendered or nurtured by putrefaction, and in mephitic air: for I am by no means certain that the Lime is not equally efficient with the Chlorine, in destroying caterpillars and other insects which derive nutriment from living vegetables. Wood-lice and other insects which attach themselves to moist and dry decay, die very soon from the effect of the Chloride, and will not attack any timber washed with it.

It may not be useless to remark, that it was a common practice, for the prevention of rot, in American-built ships, to put common salt between the linings; but from its adding so considerably to the weight, and keeping up a constant moisture in the ship, it is now, I believe, put some where about the kelsal. This practice strengthens my recommendation of the use of the Chloride of Lime for the prevention of rot; as common salt is a Chloride of Sodium, and derives its antiseptic property from the Chlorine which it contains; and the use of the Chloride of Lime for this purpose, is unattended by the objections to common salt; as it is only requisite to wash the timber with it occasionally, and it never attracts moisture.

The universal desire for common salt, is implanted in all animals undoubtedly to answer some important purpose in their economy: in the process of assimilation, it undergoes a considerable change, and in the various secretions is generally found combined with oxygen. What becomes of the Chlorine, I do not feel competent to determine; but it appears a very natural conclusion, that it is one appointed means for maintaining the fluids in a healthy state.

ON DESTROYING THE FIRE-DAMP IN MINES, BY CHLORIDE OF LIME.

On Saturday the 17th of March, 1827, I first used the Chloride of Lime in a part of the Bradford Colliery, in this neighbourhood, where the men had, the preceding week, been obliged to work with the Davy Lamp.---On Monday the 19th, although the fire-damp had been collecting all Sunday, the men were able to enter with candles, which they had previously assured me they could not do, if no good effect were produced by the application. Concluding, I presume, that it had answered, and that they could not use too much, they threw a larger quantity than I had directed into the place where they were working; and finding themselves inconvenienced by the gas, omitted any further use of the Chloride for that week, of which I was ignorant, being absent from home.

On Monday the 26th, a man was severely burnt, and died in consequence, from having attempted to enter with a candle, although provided with and charged to use the lamp. The following day, I went down the pit, and had the Chloride sprinkled when the men left work: the next morning, we drew up a candle to the spot where the man had been burnt two days preceding, and no fire ensued. The same plan was persevered in whilst the men continued working in that place; and although candles were used, no accident occurred.

On Friday the 6th of April, the Chloride was discontinued.---On Tuesday the 10th, a candle was again drawn up, and a strong explosion took place.---Until Thursday the 12th, the Chloride was still discontinued, and the inflammable gas again took fire.---On the evenings of the 12th and 13th, the Chloride was used; and on the 14th, we attempted to fire it as before, but could not succeed; and there was less appearance of inflammable gas than I had before observed.

The level or road-way (from which is the cut where the above experiments were made) runs about two hundred yards further: on the 12th of April, we went to the extremity, where we found the gas in quantity at the farthest end, and used the Chloride; on the 14th, we proceeded to the same spot with a candle, of which the flame was very slightly augmented.

From the above experiments, I feel assured---and the men express themselves satisfied---that Chlorine will destroy the fire-damp in mines.

The mode in which I have used the Chloride of Lime, is to put one pound of the powder into about five gallons of water, and, when the men have left work, to sprinkle the solution on the top and sides of the highest spot, where the hydrogen is of course the strongest: this quantity appears to suffice, as on the following morning the men proceed to work without inconvenience. In mines, therefore, where the fire-damp is so local, the expense would be trifling to keep them clear, when once effected. But I shall have a better opportunity of judging, when I have operated upon one in which it is more generally diffused: in this case, I think the Chloride should be used in every part commencing at the shaft; as the whole atmosphere of the mine would be improved, and the sub-carburetted-hydrogen would not be drawn to the highest and most dangerous parts by the partial destruction. Many other precautions will undoubtedly be necessary, as the circumstances vary of each particular mine.

It is not, of course, pretended, that the use of the Chloride of Lime can---or ought---to supersede ventillation, where it can possibly be effected. But there are situations in which this best of all remedies cannot be obtained; and in such cases, it will prove highly useful. The Davy Lamp should, on the same principle, be still used on entrance, to ascertain the state of the mine; for the evolvement of the fire-damp depends upon so many causes, that the extent on one day is no criterion for the next.

I have not pursued these experiments since I submitted them to the Royal Society, because I required no further proof of the efficacy and the practicability of employing the Chloride of Lime; and even in the event of its being a saving of expense, great difficulties would attend its introduction, from the colliers being reckless of the consequences of an explosion, and, working by the piece, they would not devote any portion of their time for the purpose; which is evident from the fact of their not being at the trouble and trifling expense of sprinkling quick-lime where they are in danger of suffocation from carbonic-acid gas, or what they call choke-damp. Should any one, however, be desirous of trying it, I would recommend, instead of sprinkling the diluted Chloride of Lime, as I did, to use one pound of the powder to a gallon of water, and to white-wash the roof of the work with it as they proceed; as it would attack the inflammable gas when it issues from the fissures of the slaty shale: or, in situations where water cannot be easily obtained, the sprinkling of the dry powder will answer every purpose, although the effect is not so immediate. The men, also, would never be inconvenienced by the gas; the remedy would require less time, and be more conveniently applied. ---If the supporters were washed with it, they would be preserved for a greater length of time.

ON THE PREVENTION OF HYDROPHOBIA.

The use of the Chloride of Soda for this purpose suggested itself to me some time since, from the hydrophobic virus being classed, by Orfila, amongst the putrescent poisons; and from the favourable opinion entertained by Fourcroy of the efficacy of oxymuriatic-acid, if applied immediately after the bite of a mad dog. The following extracts from Dr. Sully's "Observations" sanction the trial; and by disseminating, in the smallest degree, his "Plain Directions," the distressing consequences of the rabid bite may be averted, to remedy which, every attempt has hitherto proved abortive:---

"The instant a person is so unfortunate as to have been bitten by a real or suspected rabid animal, he should, without the loss of one moment, resort to the nearest pump, stream, or pool of water, and there continue to wash, wipe, and sponge the part, so as to remove all saliva from the wound, as well as from the surrounding parts. In the mean time, let a tea-kettle of hot water be made ready, and, from a considerable height, continue to pour hot water until the nearest practitioner arrives, to take the responsibility of management into his own hands. I should recommend him to persevere for several hours in the ablution and percussion with warm water, which I prefer on account of its encouraging a flow of blood; but if the patient be so situated as not to be able immediately to procure warm water, he should use cold until he can obtain warm, in preference to allowing a single moment's suspension of ablution and percussion."

"In some of our cases, after ablution had been fully used, we applied the muriate of antimony, particularly where the knife could not be so adroitly used as to prevent deformity. After this, the same cataplasms as are mentioned above, as also salivation, should immediately follow: but I believe the liquor of pure ammonia, diluted as above, is the best application, on account of its solvent property, and should be used with a forcible syringe. As a further security in the local treatment, there can be no objection to a trial of the oxymuriatic-acid to the wounds, as we are told that a person allowed himself to be bitten several times by mad dogs, and prevented the disease by washing the wounds with this acid, which succeeded even without excision."

The testimonies adduced by Dr. Sully on oxymuriatic-acid, are, however, conflicting; and without more details, it is impossible to determine whether the failures at the hospital of Lyons arose from inefficient appplication, or want of power in the remedy. There can be no question that the precaution recommended by Dr. Sully, of long continued ablution, must be the most effectual means for the removal of the virus; and it only remains to be considered whether some antidote might not be applied with the water, by which an additional security would be obtained. If Chlorine has any good effect, the application of it in combination with Soda might be easily effected, by mixing the Chloride of Soda with the water used in ablution. I should prefer the Chloride of Soda, from its being soluble, to that of Lime, as the particles of Lime might absorb the virus and be retained in the wound.

Let us see whether the other substances recommended by Dr. Sully possess any advantages over the Chloride of Soda: he sometimes applies, after ablution, the muriate of antimony, which in the dry state is a Chloride, and both are highly corrosive: in this respect, therefore, it has a superiority. But a question arises as to the use of caustic at all, and certainly not before plentiful ablution: for, should the virus have been imbibed deeper than the caustic reaches, no good effect can be produced by the application; and injury may arise from the surface being *charred,* if I may use the expression, and access to the virus prevented. He prefers, however, ammonia diluted with six times it weight of water, as a caustic wash; but if the virtue lie in its causticity, it would give place to the more active agents of this nature.

Ammonia is the Indian remedy for the venomous bite of snakes,---with what efficacy I am unacquainted. If these poisons are of an acid nature, its alkaline property might neutralize them; but I should imagine that its volatility would be of more service, in occasioning a considerable sensation of cold, by which the absorption of the virus would be retarded. The Chloride produces similar effects, being alkaline and caustic; and occasions such a degree of cold, that the hands of my men are benumbed when employed in preparing it. I can speak from personal experience of its instantly relieving the pain arising from the sting of venomous insects in this country; but the cases may not be analogous.

Dr. Sully quotes Celsus's recommendation of salt as the best remedy for the bite of a mad dog, if it is well rubbed in quite dry, and the wound afterwards healed with oil of turpentine: if there is any virtue in common salt, the Chloride of Soda should have a more powerful influence.

The foregoing remarks apply solely to the prevention of this dreadful malady; but where, unfortunately, the hydrophobic symptoms appear, a trial of the Chloride of Soda might be made with some chance of success, as it has been found to exercise a powerfully beneficial effect in ptyalism; and as a lotion in glandular affections, its remedial influence is not exceeded by that of iodine. By wrapping the person affected in cloths saturated with the Chloride of Soda, more particularly about the neck, by injections, and by giving bread pills immersed in it, as recommended by Brugnatelli, its efficacy would at once be put to a fair test. By keeping the room well sprinkled with either of the Chlorides, the Chlorine would be immediately presented to the blood through the lungs; and if the poison be putrescent, and should act upon the system through the circulation, no more direct application to the seat of the disorder could be imagined. That Chlorine acts upon the system through the lungs, I have the strongest evidence: for persons employed in bottling the Chlorides have their bowels acted upon; and by keeping some of the solution in open dishes, in my bedroom, I have myself experienced the same effects.

In conclusion, it only remains for me to add, that the Chlorides are applicable for the cure and prevention of many diseases in animals, particularly those of an infectious nature: one instance has already been adduced by Mr. Robertson, in page 5; and I have been informed by a friend who lost several horses from the glanders, the remainder being evidently affected, that the disease was stopped by using the Chloride of Lime plentifully in his stables, and washing the nostrils of the horses with it. Mr. Lacy, an extensive and highly respectable coach proprietor of this town, has been using the Chloride of Lime in all his establishments, with marked advantage to the health of his horses: he informs me, that a few years since, he lost above one hundred horses from the glanders; and the disorder was only prevented spreading still further by fumigating his stables with Chlorine gas; but he was, of course, obliged to remove all his horses, at a considerable expense. Sprinkling the stables, and washing the racks and mangers, with the Chloride of Lime, is equally efficacious when the disorder rages, without removing any of the horses; and by its occasional use at night, to purify the air of close and confined stables, and mixing some with the white-wash for the walls, this and other infectious diseases may be prevented. It has also been beneficially applied to the grease in horses, the foul in bullocks, foot-rot in sheep, and mange in dogs.

I cannot omit mentioning, that in an extensive concern for the preparation of oil-colours, in Liverpool, the proprietor has derived great benefit to the health of himself and work-people, from the sprinkling of the Chloride of Lime, and allowing some to remain in open vessels, where the men are at work: a similar use would, I have no doubt, be attended by equally good effects in lead-mines and smelting-houses, where the arsenuretted hydrogen is so destructive to life.

To the conclusive testimonies adduced in the foregoing pages, upon the salutary influence of the Chlorides of Lime and Soda in a great variety of analogous cases, no valid objection can, I trust, be advanced, that they are brought forward by one interested in their preparation, although this circumstance may naturally excite doubts upon his individual opinions, and call for actual experiments by others:— to that ordeal I willingly submit the Chlorides.

THE END.

WELLCOME LIBRARY INSTITUTE

G. Cave, Printer, Manchester.